CUADERNOS ECONÓMICOS ICE INFORMACIÓN COMERCIAL ESPAÑOLA

Climate action 2.0: can Green Deals help deliver a just Net-Zero Transition?

Acción climática 2.0: ¿pueden los Pactos Verdes llevarnos a una transición justa hacia las emisiones netas nulas?

Lara Lázaro Touza
Centro de Enseñanza Superior Cardenal Cisneros y Real Instituto Elcano

Gonzalo Escribano Francés
Universidad Nacional de Educación a Distancia y Real Instituto Elcano

Abstract

Structural economic reform is needed on an unprecedented scale and at an unprecedented rate to avert the worst impacts of climate change. Drawing on the lessons learned from Roosevelt's New Deal, the paper analyses the extent to which green deal proposals and recovery plans put forth this century can deliver climate-resilient development according to a green growth (ecomodernisation) perspective. The paper concludes that while some greening of laws and post-crisis stimulus packages has been observed, it cannot be unequivocally concluded that pro-growth green deals can deliver a just net-zero and just transition.

Keywords: *New Deal, green fiscal stimulus, green New Deal, ecomodernisation, degrowth.*
JEL classification: *Q10, H3, Q480, Q5.*

Resumen

Es necesaria una reforma estructural sin precedentes para evitar los peores impactos del cambio climático. Partiendo del New Deal de Roosevelt, se analiza en qué medida los pactos verdes propuestos y los planes de recuperación presentados desde principios de siglo pueden resultar en un desarrollo resiliente al clima según el enfoque del crecimiento verde y la ecomodernización. El artículo concluye que, si bien la legislación y los paquetes de recuperación contienen elementos «verdes», no se puede afirmar de manera inequívoca que los pactos verdes resulten en una transición justa hacia las emisiones netas nulas.

Palabras clave: *New Deal, estímulo fiscal verde, new deal verde, ecomodernización, decrecimiento.*

DOI: https://doi.org/10.32796/cice.2022.104.7475
Recibido: Abril 2022 · Aceptado: Agosto 2022

1. Introduction

Structural economic reform is needed globally at an unprecedented rate to avert the worst impacts of climate change (Köberle et al., 2021). The Intergovernmental Panel on Climate Change (IPCC) quantified the magnitude of the required change: by 2030 greenhouse gas emissions need to be approximately 45 % below 2010 levels and should reach net-zero around 2050 to limit global mean temperature increase to 1.5 °C compared to pre-industrial levels[1] (Rogelj et al., 2018). The above-mentioned temperature increase is the lower bound of those included in the Paris Agreement in 2015, with the higher bound being set at "well below 2 °C"[2]. Current international climate commitments under the Paris Agreement (Nationally Determined Contributions, NDCs) however will lead to further increases in greenhouse gas (GHG) emissions, estimated at +13.7 % in 2030 compared to 2010 (UNFCCC, 2021).

The ubiquitous presence of greenhouse gases that result in anthropogenic climate change represent a market failure of global proportions which has resulted in over three decades of (clearly insufficient) government intervention. Although command and control is by far the most common approach to address market failures in the environmental policy realm (e.g., through setting standards and legally binding requirements for public and private stakeholders) they are inefficient when damage curves are relatively flat. Market Based Instruments (MBIs) (e.g., taxes, tradable permits, etc.) are, at least theoretically, statically and dynamically efficient, and hence superior from a purely economic perspective (Weitzman, 1974). Political feasibility and acceptability by stakeholders[3] limit the extent to which MBIs are used. Said MBIs have nevertheless become increasingly popular since the 80's. The European Emission Trading System (EU-ETS) for instance is one of the flagship climate policy instruments used in the European Union (EU).

Success of climate policy in certain jurisdictions has been significant. The EU has reduced its Greenhouse gas (GHG) emissions by 23 % since 1990 while its Gross Domestic Product (GDP) has grown by over 60 %. A recent analysis of 18 developed countries by Le Queré et al. (2019) finds decoupling of GDP and GHG emissions

---

[1] The above figures are applicable to no overshoot scenarios. To have a 66% probability of limiting temperature increases to 2 °C GHG emissions should be around 25% lower than in 2010 by 2030 and reaching Net-Zero around 2070.

[2] The latest international climate meeting in Glasgow, known as the 26th Conference of the Parties (COP26), de facto enhanced global climate ambition by recognising that a mean temperature increase of 1.5 °C would mean significantly less impacts than limiting global mean temperatures to 'well below' 2 °C.

We are however far from limiting global mean temperature increases to 1.5 °C. The International Energy Agency estimated in 2021 that temperature increases could be limited to 1.8 °C if all net-zero pledges were implemented (IEA, 2021). Said temperature increase would rise to 2.4 °C compared to pre-industrial levels if all countries implemented climate action pledges under the Paris Agreement (known as Nationally Determined Contributions or NDCs) submitted until late 2021. NDCs do not include net-zero pledges that would materialise later and are hence more uncertain. If climate action was limited solely to current policies the global mean temperature increase is estimated at 2.7 °C by the end of the century, compared to pre-industrial temperatures (Climate Action Tracker, 2021).

[3] Command and Control measures (CAC) can be easier to lobby; they do not require companies to pay for every unit emitted and they are better aligned with the moral sense of right and wrong.

due to the displacement of fossil fuels by renewables, among other. However, a recent extensive review of the literature on decoupling by Haberl et al. (2020) shows that absolute decoupling of GHG and growth is not happening globally and that the observed cases of decoupling are insufficient to deliver our collectively agreed climate goals. In fact, globally, greenhouse gas emissions (measured in $GtCO_2e$) have increased approximately 58% between 1990 and 2019 (UNEP, 2020). The extent to which past lack of global decoupling will extend to the future is at this stage uncertain. To achieve global decoupling of GHG emissions and growth, investments in renewables and energy efficiency between 1.5% and 2% of global GDP annually (estimated at $1.5 trillion[4]) would be required according to Pollin (2018). We are however far from this level of clean investment. Mathis (2022) states that in 2021 low carbon investment amounted to $755 billion (with $366 billion in renewables and $273 in transport electrification), a significant increase (27%) from 2020 but lower that what is required for absolute decoupling of emissions and growth. Policy is hence seen as key to align financial flows with climate goals, helping shift to the "trillions" in climate finance.

Acknowledging the limited success in GHG emission reductions some governments have embraced green deal narratives and programmes (within a green growth paradigm) to try and bring about the structural transformation needed to abide by the temperature goals enshrined in the Paris Agreement. Some of these green deal proposals could lead to adopting enhanced climate policies for a deep transformation of the economy, at least on paper. Examples of elements that have been included in recent green deal proposals include: climate laws with ambitious net-zero targets, legally binding requirements for the penetration of renewable energy sources (RES), banning fracking, phasing out fossil fuel subsidies and investing in clean Research and Development (R&D), among others (EC, 2019; Galvin & Healy, 2020; Barbier, 2019a, 2019b).

Additionally, both in the aftermath of the Global Financial Crisis of 2008-2009 and in the wake of COVID-19, large fiscal stimulus packages have been put forward, with at least 10% of the funds globally allocated to green stimulus (Barbier, 2019a, 2019b; Vivid Economics and Finance for Biodiversity Initiative, 2021).

The question remains though as to whether national or regional green deal proposals, plus post crises fiscal stimulus packages inspired by Roosevelt's Keynesian New Deal can help deliver a just net-zero transition by deeply transforming the economic model through green Keynesianism.

In order to explore whether national and regional green deal proposals and recovery programmes can help deliver a just net-zero transition, the authors have surveyed the academic and grey literature, building, among other, on analyses commissioned by the Elcano Royal Institute on post-COVID recovery programmes of the five largest European greenhouse gas emitters (Berghmans, 2021; Bieliszczuk, 2021; Feás & Steinberg, 2021; Kiefer, 2021; Leonardi & Bellisai, 2021; Lázaro Touza et al., 2022).

[4] Please note that trillion = 10 to the power of 12 and billion = 10 to the power of 9.

The article is structured as follows: Section 2 briefly discusses the impacts of climate change that support climate policies and green deal proposals. Section 3 reviews some of the key elements of green deal proposals that are inspired by Roosevelt's New Deal. It also presents some of the defining features of COVID-19 recovery programmes. Section 4 discusses the extent to which green deal policies can be thought to deliver both economic growth and positive climate impacts and whether the New Deal framing is fit to address the climate emergency. Section 5 concludes.

2. Climate change and its impacts in brief

The impacts of limited climate action in the past and insufficient commitments at present beg the question of whether we can operate within planetary boundaries (Rockström et al., 2009). The latest analysis of peer-reviewed literature undertaken by the Intergovernmental Panel on Climate Change (IPCC), known as the Sixth Assessment Report (AR6) (IPCC, 2021; IPCC, 2022), states that human induced climate change is unequivocal. Some impacts of climate change are unprecedented in hundreds to thousands of years, especially in the ocean, ice sheets and as regards sea level rise (estimated to range between 0.28m and over 1m by the end of the century compared with 1995-2014 levels, depending on the scenarios analysed).

Extreme weather events and compound extremes (e.g., concurrent heatwaves and droughts) have become more frequent and severe, and have been more readily attributed to humans since the AR5 was published. Extreme weather and climate events can affect supply-chains and markets across national borders. Slow on-set climate change can cause redistribution of natural resource stocks such as fisheries, which will require enhanced cooperation to limit resource management conflicts. The water cycle will continue to intensify. Global precipitations could increase up to 13% depending on the scenarios analysed. However, wet regions will potentially experience significantly higher precipitations whereas dry regions could be subject to significant reductions in precipitations, i.e., exacerbating pre-existing trends.

Between 3.3 and 3.6 billion people are exposed to environments that are highly vulnerable to climate change. Half of the species analysed have shifted to higher lands towards the poles. Significant levels of biodiversity loss are also likely. These could range from 3% to 48% of species in terrestrial ecosystems, depending on the warming scenarios (*Ibid.*). The irreversibility of extinction makes these findings particularly worrying.

Estimates are inherently uncertain regarding the macroeconomic impact of temperature increases expected under current climate pledges. The IPCC's AR6 explains that although economic damages increase in a non-linear fashion as temperatures rise, the varying methodologies, data limitations and lack of comparability across studies prevents the authors from offering robust data on the economic impacts of climate change (IPCC, 2022). Nevertheless, some relatively recent estimates are briefly mentioned for reference purposes, while reiterating the difficulties and inherent uncertainty of future impacts, damages of and of allocating an

economic value to these. Nordhaus and Moffat (2017) analysed the economic impacts of climate change using estimates from 36 studies concluding that a 3ºC warming[5] would lead to a loss of GDP of about 3%. More recent empirical studies gathering evidence of the impacts of climate over the last 5 decades indicate the economic impact of a 3ºC increase could range between 5% and over 20% of GDP (Dietz, 2019).

Estimates on the cost of mitigation are also wide-ranging. Köberle et al. (2021) provide an up-to-date summary of these estimates and conclude that mitigation costs could range between 1% and 4% of GDP throughout the century depending on the socioeconomic pathways analysed, with expected GDP growth ranging from 300% to 900% throughout the century. Annualised reductions in the growth rate of consumption arising from mitigation costs would range between 0.04% and 0.14% (*Ibid.*). Given the above research on the cost of climate change and the cost of mitigation one plausible explanation for limited climate action is that short-term costs of action are borne by a concrete group of (high-income) countries over the short-to-medium term while the benefits of action would occur in the long-run and benefit people across jurisdictions (Hope & Newberry, 2006), benefitting vulnerable people the most.

Adding to the above-discussed time and space burden-sharing asymmetry, as well as the public good nature of a stable climate and the free-rider problem of providing such stable climate, at this stage it is unclear whether limiting temperature increases to 1.5ºC would pass a cost-benefit test. However, given the potentially catastrophic consequences unfettered human-induced climate change could have, it has been argued that climate action could be considered a matter of insuring socioeconomic and environmental systems against the worst impacts of climate change rather than passing a cost-benefit test. Furthermore, science tells us that if we want to retain the option of limiting temperature increases to 1.5ºC deep and accelerated mitigation is called for (Dietz, 2019) in the current decade.

Conscious of the above impacts of climate, green deals and (more or less green) fiscal stimulus packages have been proposed as wide-ranging programmes to change the structure of the economy across jurisdictions.

3. From the New Deal to Green New Deals

3.1. The New Deal

In the aftermath of the Great Depression Franklin D. Roosevelt embraced a Keynesian response to deliver economic recovery that has been touted as economic experimentation rather than economic planning. This response came to be known as the New Deal. It was based on two pillars 1) reducing unemployment 2) providing economic security, welfare and a safety net when the market was unable to deliver these. Roosevelt deployed a myriad of initiatives to support the unemployed,

[5] A common calibration point in these analyses.

accelerate recovery and engage in "the kind of structural reform that could protect people in future crises" (Winkler, 2009).

Leading figures of Keynesianism such as Gardner Means, Alvin Hansen as well as John Maynard Keynes shared the following insights regarding the Great Depression (Green, 2020):

a) The underlying cause of the Great Depression was underconsumption. It hence followed that the Great Depression would be overcome by increasing consumption. According to Green (2020), Roosevelt's Keynesian-inspired New Deal embraced "productivism" which meant full production, full employment and high consumption.
b) The economy is not static and governed by "immutable laws". Economic policies should therefore be tailored towards the historical context in which they were to be deployed.

Key initiatives within the New Deal were geared towards reducing the perception of uncertainty and risk by consumers, providing assurances to bank depositors and lenders, providing information to investors, ensuring predictable wages for vulnerable workers, providing a social safety net for workers and retirees (Kennedy, 2009). Roosevelt's New Deal sought to reactivate economic growth through investments in many economic sectors including transport and energy infrastructure, forest and water management initiatives. The New Deal additionally trained millions of young unemployed workers (The Living New Deal, 2022).

Kennedy (2009) argues that the New Deal brought about the largest social and institutional change in American history. It also arguably brought "stability and predictability" to the US economy and helped develop the building blocks for sustained economic growth, even if it failed to fully resolve short-term economic woes derived from the Great Depression (including a high unemployment rate) (*Ibid.*). Shiller (2017) further argues that the post-2008 crisis interest in Roosevelt or the New Deal may be explained as an efficient way to communicate a basic economic recovery narrative.

3.2. Green Deals in the Global Financial Crisis era

Thomas Friedman is credited to have coined the idea of a green deal that would address America's ailments in the XXIst century: (lack of) jobs, rising temperatures and terrorism (Friedman, 2007). The green deal amounted to an overarching programme that could allegedly be supported across the aisle to address the key challenges of the United States by investing in renewables, mandating efficiency standards, etc. Also in 2007, and inspired by Roosevelt's New Deal, the Green New Deal Group proposed a set of structural reform measures to address the Global Financial Crisis (GFC), climate change and the energy price spike in the United Kingdom. These measures included both the regulation of financial systems and taxation, as well as an on-going and widespread low-carbon investment programme coupled with demand-side management initiatives (Green New Deal Group, 2008).

Similarly, yet broader in scope, the United Nations Environment Programme commissioned a report in the aftermath of the 2008 Global Financial Crisis (GFC) where it was acknowledged that economic recovery would require the same kind of response as that of Roosevelt's New Deal. However, to ensure a lasting and sustainable recovery it was argued that a larger, and more green-tailored approach, would be needed (Barbier, 2009a, 2009b). To ensure long-lasting growth UNEP's Global Green New Deal called for addressing global environmental and social challenges (reducing emissions, preserving ecosystems, preventing water scarcity and protecting the vulnerable) in addition to recovering from the Global Financial Crisis. The UNEP-commissioned report acknowledged however that few fiscal stimulus packages put forth after the Global Financial Crisis would amount to a Green Deal that ensured lasting, green and just economic recovery.

The UNEP report recommended that developed high- and middle- income countries in the G20 spent 1 % of their GDP in the two years following the publication of the report on reducing emissions, phasing out fossil-fuel subsidies, implementing carbon pricing policies, etc. As of December 2009, only a handful of countries (Australia, China, Japan, Saudi Arabia and South Korea) had allocated 1 % or more of their GDP to green stimulus (GS), and even less had allocated 1 % of their GDP to low carbon power and energy efficiency measures (Australia, China, Japan and South Korea), see Table 1 for further details[6].

Overall, countries around the world eyed energy efficiency and investments in renewables in their countercyclical fiscal stimulus packages in response to the Global Financial Crisis (Mastini et al., 2021). Out of the global fiscal stimulus provided in the aftermath of the 2008 Global Financial Crisis (>US$ 3 trillion up to July 2009), 15.7 % was allocated to green fiscal stimulus (Barbier, 2016; Nahm et al., 2022).

The majority of said green stimulus (US$ 443 billion out of $522.1 billion) was allocated to low carbon investments and energy efficiency. These included renewable energy, nuclear, carbon capture and storage, energy efficiency, public transport, railways and improving power grids. More specifically, under two thirds (64.2 %) of the green fiscal stimulus was allocated to energy efficiency (energy conservation in buildings; fuel-efficient vehicles; public transport and rail; and improving electrical-grid transmission). Low carbon power (classified by Barbier as including renewables, nuclear and Carbon Capture and Storage, CCS) received 20.6 % of the green stimulus. Water conservation, treatment and supply, alongside waste and pollution control received the remaining 15.15 % of the green stimulus funds. A further breakdown of investments shows that rail infrastructure received over a quarter of green investments (26 %), the power grid (18 %) and increasing energy efficiency in buildings (17 %). A lower 8 % of the green stimulus was allocated to nuclear and renewables, see Figure 1.

[6] Note that Barbier published estimates for fiscal stimulus programs that covered investments up to December 2009.

TABLE 1

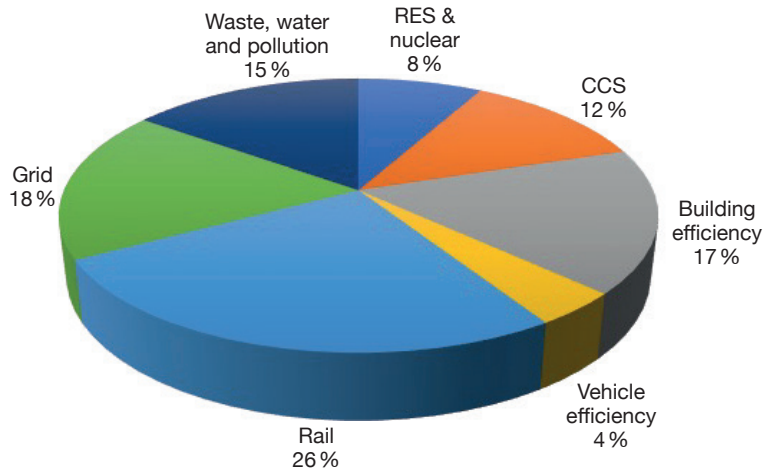
GLOBAL GREEN STIMULUS, FROM SEPTEMBER 2008 THROUGH DECEMBER 2009

		Green Stimulus (GS), US$ billion (bn)						
	Total Fiscal Stimulus (TS) US$ bn	**Low Carbon Power[a]**	**Energy Efficiency[b]**	**Waste, Water & Pollution[c]**	**Total green stimulus**	**GDP (US bn)[d]**	**GS as % of TS**	**GS as % of GDP**
Argentina	13.2					526.4	0.0	0.0
Australia	43.8	3.5	6.5		9.9	773.0	22.7	1.3
Brazil	3.6					1,849.0	0.0	0.0
Canada	31.8	1.1	1.4	0.3	2.8	1,271.0	8.7	0.2
China	649.1	1.6	182.4	34.0	218.8	7,099.0	33.6	3.1
France	33.7	0.9	5.1	0.2	6.2	2,075.0	18.2	0.3
Germany	104.8		13.8		13.8	2,807.0	13.2	0.5
India	13.7		1.0		1.0	2,966.0	7.3	0.0
Indonesia	5.9	0.1	0.0		0.1	843.7	1.7	0.0
Italy	103.5		1.3		1.3	1,800.0	1.3	0.1
Japan	711.9	14.0	29.1	0.2	43.3	4,272.0	6.1	1.0
Mexico	7.7		0.8		0.8	1,353.0	9.7	0.1
Russia	20.0					2,097.0	0.0	0.0
Saudi Arabia	126.8			9.5	9.5	546.0	7.5	1.7
South Africa	7.5		0.7	0.1	0.8	467.8	10.7	0.2
South Korea	76.1	30.9	15.2	13.8	59.9	1,206.0	78.7	5.0
Turkey						853.9		0.0
United Kingdom	35.5	0.9	4.9	0.1	5.8	2,130.0	16.3	0.3
United States	976.9	39.3	58.3	20.0	117.7	13,780.0	12.0	0.9
European Union[e]	38.8	13.1	9.6		22.8	14,430.0	58.7	0.2
Total G20	3,004.3	105.3	330.1	78.1	513.5	63,145.8	17.1	0.8
Total Other[f]	314.1	2.3	5.3	1.0	8.6	6,902.9	2.7	0.1
Global Total	**3,318.4**	**107.6**	**335.4**	**79.1**	**522.1**	**70,048.7**	**15.7**	**0.7**

NOTES: [a] Support for renewable energy (geothermal, hydro, wind and solar), nuclear power, and carbon capture and sequestration. [b] Support for energy conservation in buildings; fuel-efficient vehicles; public transport and rail; and improving electrical-grid transmission. [c] Support for water, waste, and pollution control, including water conservation, treatment, and supply. [d] Based on 2007 estimated Gross Domestic Product (GDP) in terms of purchasing power parity. [e] Only the direct contribution by the European Union (EU) is included. [f] Includes the national stimulus packages of non-G20 EU countries: Austria, Belgium, Greece, Hungary, the Netherlands, Poland, Portugal, Spain, and Sweden. The non-EU countries in this group are Chile, Israel, Malaysia, New Zealand, Norway, the Philippines, Switzerland, Thailand, and Vietnam.

SOURCE: Barbier (2016)

FIGURE 1
BREAKDOWN OF GLOBAL GREEN STIMULUS INVESTMENTS 2008-2009
(In %)



SOURCE: Authors based on Barbier (2016).

3.3. Pre-COVID Green Deals

Before the outbreak of the COVID-19 pandemic a new round of green deal proposals emerged. Arguably, the most influential ones have been the Green New Deal (GND) proposal by US congresswoman Alexandria Ocasio-Cortez and Senator Ed Markey (supported by Senator Bernie Sanders), and the European Green Deal (EGD) proposed by the President of the European Commission Ursula von der Leyen. These green deal proposals build on and go beyond the use of market-based and command and control instruments to address climate change by providing an all-encompassing vision of a net-zero development model that is inclusive and seeks to deliver a just transition.

In the US, the Green New Deal proposal resembles Roosevelt's New Deal insofar as it embraces a pro-growth approach (Green, 2020). Roosevelt's New Deal and the Green New Deal invest significant funds in hard infrastructure (in the power, water and transport sectors) and the environment. However, in the current carbon constrained context, the emphasis of the Green New Deal on clean power is distinct, as is the greater focus on R&D and clean R&D. When compared with the 2008 US fiscal stimulus package, the weight of low carbon power, energy efficiency and clean transport is significantly larger in size (x6) in the 2019 Green New Deal proposal.

President Joe Biden stated that the Green New Deal is critical in facing the climate challenge. It is therefore unsurprising that Biden's Build Back Better (BBB) plan, that amounted to $1.75 trillion, shared elements of the Green New Deal proposal (White House, undated). In the BBB the Biden-Harris administration proposed tax

credits and rebates to help families shift to clean energy and increase electrification. More specifically the BBB pledged to reduce the cost of installing solar rooftop by 30% and reducing the cost of purchasing American built EVs by $12,500. It also foresaw handing out grants and loans to rural communities to shift to clean energy.

An additional goal of the BBB was to develop a "made in America" clean energy technology supply chain through grants, loans, tax credits and green procurement. Through a Clean Energy Accelerator public transport would be greened, capacity building reinforced, and a Civilian Climate Corps of 300,000 Americans employed to protect public land, help adapt and build resilience to climate change. Coastal restoration, forest management and soil conservation were also the focus of the BBB, with farmers playing a key role.

The BBB Act didn't pass, among others, due to the opposition by senator Joe Manchin, a democrat from West Virginia (Manchin, 2021). Other proposals by Manchin and colleagues to raise taxes on the rich to reduce debt and address climate change (Washington Post, 2022) emerged. In fact, in August 2022, the House of Representatives passed the Inflation Reduction Act that included a $369 billion climate package. The bill is expected to reduce US GHG by 40% by 2030 vs 2005 levels; insufficient to meet US latest NDC goals but the largest climate spending package to date (Greve, 2022).

The US also passed the Infrastructure Investment and Jobs Act[7], known as the Bipartisan Infrastructure Law in November 2021. This is a $1.2 trillion programme with $500 billion in new funding for infrastructure. Some of the investments in transport infrastructure seek to green the transport sector and address pollution. A summary of some of these investments is provided in Table 2.

Moving on to the EU, the European Green Deal (EGD) seeks to deliver climate neutrality in the EU by 2050. It is set to be Europe's new growth and competitiveness strategy in a climate neutral future. A strategy that strives to decouple resource use from economic growth and where natural capital is maintained or enhanced, akin to the strong sustainability paradigm (Neumayer, 2013), while protecting the health and well-being of Europeans (EC, 2019). Key elements of the European Green Deal include: becoming the "first climate neutral continent" by 2050 and increasing climate ambition by 2030; ensuring energy security; pursuing a clean and circular model for European industry; helping ramp up the transition to smart mobility; greening the food system; reducing pollution; protecting biodiversity; maintaining EU's climate leadership globally; financing the low-carbon transition; ensuring an inclusive and just transition for industries, workers and regions and engaging citizens through a European Climate Pact.

[6] Biden's BBB plan included the American Rescue Plan, the American Jobs Plan and American Families Plan. The Infrastructure Investment and Jobs Act includes some of the investments proposed in the American Jobs Plan.

TABLE 2
INFRASTRUCTURE INVESTMENT AND JOBS ACT: ENERGY, CLIMATE & ENVIRONMENT

Area	Description	Amount($ billion)
Power	Updating power lines and funding clean energy.	65
Water	Funding is allocated to lead pipe replacement programme and the provision of clean water to communities.	55
	Funding will include water treatment, storage, and reuse to address droughts in the west	8
Climate change (& cybersecurity)	Funding would cover both slow on-set and extreme weather events: coastal erosion, droughts, floods and wildfires.	>50
Transport	Funds upgrades to the public transport system.	39
	Includes funding for reducing truck emissions at ports.	17
	Funds EV charging stations	7.5
	Funds EV school buses	7.5
Environment	Funding would include the clean-up of polluted mining sites as well as oil and gas wells.	21
Total		**≥270**

SOURCE: Authors based on Probasco (2022).

Some salient legislative and executive measures within the European Green Deal include:

1. *European Climate Law* that enshrines the climate neutrality target by 2050 into law and the reduction of at least 55% of GHG emissions by 2030. It also created the European Scientific Advisory Board on Climate Change, an expert body tasked with providing independent and scientific advice on EU climate action (measures, targets and GHG budgets) and its alignment with the EU Climate Law and the EU's international climate commitments (EEA, 2022).
2. Update of the *Energy Taxation Directive* aligning energy taxation with the EU's climate goals (taxing fuels according to their energy content and environmental performance, not according to their volume), phase out fossil fuel subsidies and encourage the uptake of clean technologies. The update of the Energy Taxation Directive is part of the European Green Deal (EGD's) Fit for 55 package[8].

[8] The Fit for 55 package is a set of legislative and executive proposals (and reviews) aimed at delivering the EU's climate goals. It is structured around different instruments: pricing, targets, rules and support measures.

3. *The Carbon Border Adjustment Mechanism (CBAM)*. *The* CBAM seeks to prevent carbon leakage and provide a level playing field for European companies so that environmental regulation and taxation does not unfairly disadvantage them. Operationally, the CBAM would ensure European and non-European products and imports bare the same carbon price. EU importers would purchase carbon certificates reflecting the carbon price that their imports would have endured should production had occurred in the EU. When an equivalent carbon price has been applied in the country of origin, importers would deduct the cost of CBAM. A gradual phase in of the CBAM is expected (with reporting requirements from 2023 to 2025) and would initially be applied to a handful of sectors: iron and steel, cement, fertilisers, aluminium and power generation. However, proposals to expand its scope to organic chemicals, hydrogen, polymers and indirect emissions were tabled in late 2021. The CBAM is part of the EGD's Fit for 55 package.
4. Updated *Renewable Energy Directive*. The EU's goal of reducing GHG emissions by at least 55% by 2030 compared to 1990 levels required, according to the European Commission (EC), a higher share of renewables in its final energy consumption of 40% (*vs.* the previous 32%). This headline target is divided into sectoral targets including heretofore hard to abate sectors such as buildings and transport[9]. The updated Renewable Energy Directive is part of the EGD's Fit for 55 package.
5. A recast *Energy Efficiency Directive*. The goal would be to reduce primary energy consumption by 39% and final energy consumption by 36% by 2030. These goals would carry indicative energy efficiency targets for Member States and would almost double energy efficiency requirements compared to previous energy efficiency goals. Building renovations, improving efficiency in heating and cooling systems, addressing energy poverty and empowering consumers are seen as key enablers of the above energy efficiency goals. The updated Energy Efficiency Directive is part of the EGD's Fit for 55 package.
6. Review of the *Effort Sharing Regulation* (ESR) (or as civil society is suggesting calling it the Climate Action Regulation for Europe, CARE). The proposed goal is to reduce emissions of non-ETS sectors by 40% by 2030 compared to 2005 emission levels. The updated *Land Use, Land Use Change and Forestry (LULUCF) regulation* is part of the EGD's Fit for 55 package.
7. Revision of the *EU Emissions Trading System (EU ETS)*. The EU ETS is one of the pillars of EU decarbonisation. The revised ETS will align this market-based instrument with the 2030 climate goals. This will mean a 61%

[9] The above mentioned renewables (RES) sectoral targets include: 49% RES of energy use in EU buildings; +1.1% annual increase in RES use by industry; a binding target of +1.1% annual increase in the use of RES in heating and cooling; an indicative target of +2.1% in the use of RES in district heating and cooling; a decrease GHG intensity of transport fuels by 13%; a minimum 2.2% share of advanced biofuels in transport; a 2.6% target for renewable fuels (mainly hydrogen) in transport; a 50% share of RES in hydrogen consumption in industry.

GHG emission reductions in ETS sectors has been proposed (up from a 43% reduction required at present). A reduction in the cap and an increase in the linear reduction factor (from 2.2% to 4.2% per year) is called for to accelerate emission reductions. The revised ETS would include maritime transport under the current proposal. A revision of the ETS for aviation is also proposed. Additionally, a new ETS for buildings and transport is proposed, while maintaining emission reduction targets under the ESR for these sectors. The revision and expansion in the EU ETS is included in the Fit for 55 EGD implementation package.

8. To reduce the impact of the new ETS for the buildings and transport sector the EC proposed a *Social Climate Fund* that would amount to 25% of the revenues obtained from auctioning emission permits under the new ETS. This would amount to € 72.2 billion that would be complemented by national funds. Funds would be used to improve energy efficiency in buildings, integrating renewables, supporting low carbon mobility and supporting vulnerable households. The Social Climate Fund is part of the EGD's Fit for 55 package.

To implement the EGD the EU developed the European Green Deal Investment Plan, also known as the Sustainable Europe Investment Plan which:

1. Seeks to mobilise at least €1trillion up to 2030 with the following breakdown and funding sources: €503 billion will come from the EU budget; €25 billion from the EU ETS; €143 billion to be allocated for the Just Transition Mechanism to support workers, regions and industries; InvestEU[10] which is expected to leverage €279 billion of public and private investments for climate and environmental projects between 2021 and 2030; and, national co-financing of structural funds amounting to €114 billion.
2. Has developed an enabling framework including the EU Taxonomy, the EU Green Bond Standard and green public procurement requirements.
3. Will strive to develop a sustainable project pipeline by providing advice and technical support to project promoters and public administrators.

The above brief description of some of the key European Green Deal proposals shows the breadth and depth of the EU's net-zero implementation programme. A programme that includes the Fit for 55 implementation package (as indicated above) and which was being negotiated at the time of writing.

[10] InvestEU is a fund that includes 13 EU financial instruments and the European Fund for Strategic Investments. It seeks to finance sustainable infrastructure, research, innovation and digitization, SMEs and social investments and skills.

3.4. Post COVID-19 recovery plans

Academic literature, grey literature and political declarations made it clear that several countries and regions (e.g., the EU, the US, South Korea, Canada) would seek to recover from COVID-19 and transform their economies into low(er) carbon growth engines building on the Green Deal ethos. Given the limited time that has passed since the announcement of COVID-19 recovery packages and the fact that their implementation is on-going at the time of writing, the following analysis is based on government plans rather than on investments executed.

A recent analysis by Vivid Economics and Finance for Biodiversity Initiative (2021) showed that up until July 2021, the global fiscal stimulus planned to recover from the COVID-19 pandemic amounted to US$ 17.2 trillion in G20 plus other selected countries[11]. Even if fiscal stimulus in these G20+ countries is over five times that of the Global Financial Crisis, the authors argue that in percentage terms, the COVID-19 green response is proportionally smaller than that of the 2008-2009 recovery (10,4%[12] versus 15.7% in the post Global Financial Crisis green fiscal stimulus). Sectors that were the hardest hit by the pandemic across the countries analysed received the bulk of the funding (industry, transport, energy and, to a lesser extent, agriculture).

The OECD's Green Recovery Database update published in September 2021 indicates that green stimulus in OECD countries and partner countries[13] amounted to 21% of total COVID-19 recovery spending. Although significant, green spending is argued to be substantially lower than the continued support received by fossil fuels. The OECD study finds, similarly to the Vivid study, that most green fiscal stimulus was planned to support mitigation goals, disregarding broader climate and environmental challenges such as adaptation or biodiversity losses. In terms of the sectoral allocation of funds ground transport, energy, buildings and industry (in that order) receive the bulk of green stimulus across the OECD countries analysed while R&D and agriculture receive limited funds (OECD, 2021), see Figure 2.

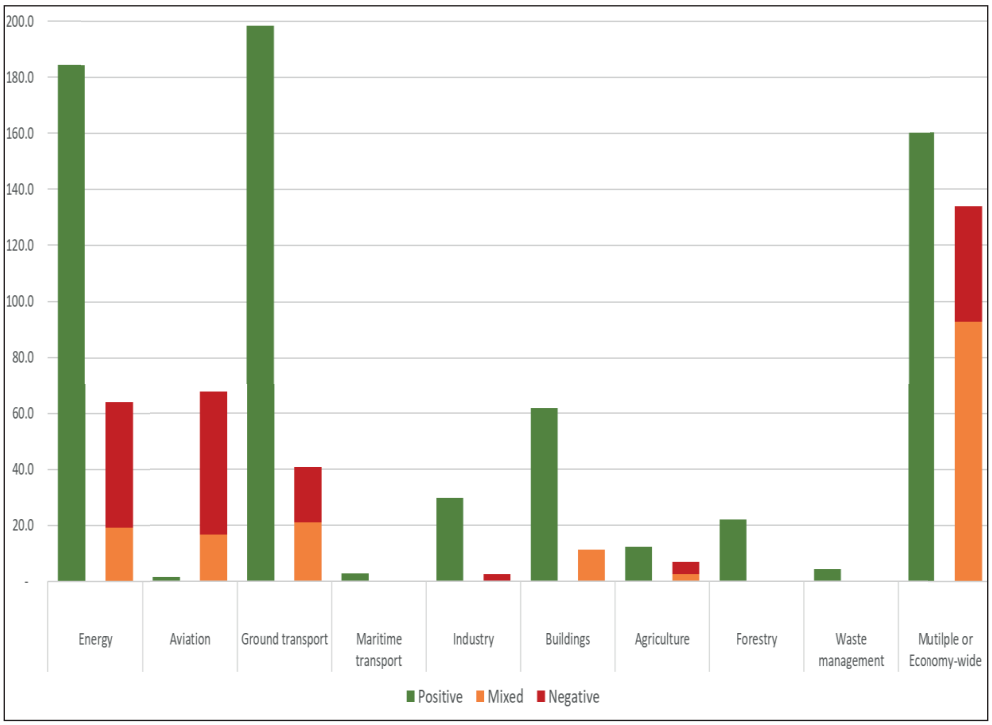
---

[11] The Vivid Economics and Finance for Biodiversity Initiative study included G20 countries (Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States, and the European Union), plus the Nordic countries, Colombia, Switzerland, Spain, Singapore and the Philippines.

[12] Note that other authors analysing the $14 trillion in post-COVID fiscal stimulus planned by G20 countries estimate that only 6% was allocated to reducing GHG emissions while 3% was allocated to supporting activities that can increase emissions such as subsidising the coal industry (Nahm et al., 2022). Earlier analysis such as Herburn et al. (2020) indicated that only 4% of global post-COVID fiscal stimulus could be considered 'green' (i.e. potentially driving down GHG emissions), with a further 4% considered 'brown' (i.e. potentially increasing emissions) and 92% being colourless (maintaining the status quo).

[13] OECD countries include: Austria, Australia, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak, Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

FIGURE 2
FUNDING TOTALS BY SECTOR AND BY ENVIRONMENTAL IMPACT

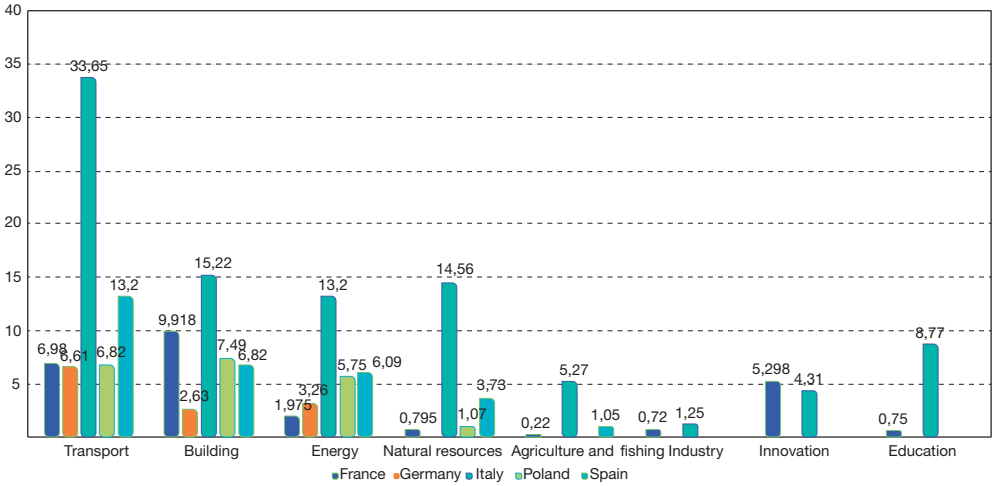


SOURCE: OECD (2021).

Focusing on the EU, the five largest GHG emitters (Germany, France, Italy, Poland and Spain) allocate 37% or more of their planned investments to support climate objectives, also allocating 20% or more of the funds to the digital transition as required by the EU (Lázaro Touza et al., 2022). As for the sectoral breakdown of National Recovery and Resilience Plans (NRRPs) across the EU's five largest emitters Figure 3 indicates that transport, building and energy are the key recipients of what we have termed 'high-impact' climate investments (contributing 40% or more to climate objectives). Figures 3 and 4 provide a country and sectoral breakdown of said high climate-impact investments in absolute and relative terms.

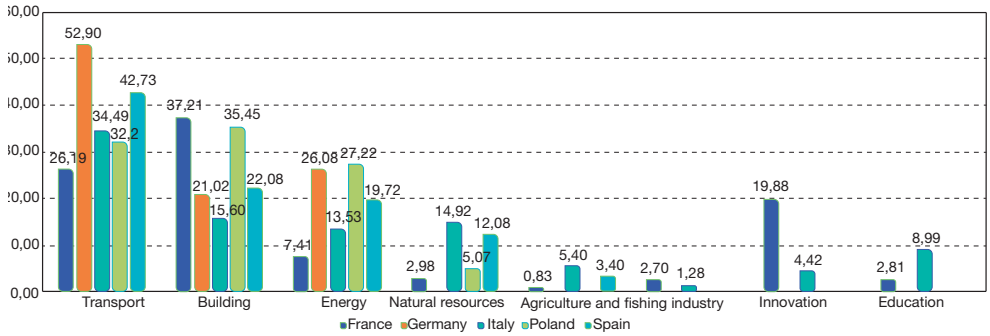
Funds with a high climate impact or "climate tag" (contributing 40% or more to climate objectives) are aligned with the EU's priorities called "flagships": flagship 1 (Power Up) on clean technologies and renewables, flagship 2 (Renovate) on improving energy efficiency of public and private buildings, and flagship 3 (Recharge and Refuel) on sustainable transport, charging stations and extending public transport. The transport (including aviation), building (households, commerce, institutions and others) and energy (energy industries) jointly amounted to 64,1% of emissions in the EU-27 in 2019 (Eurostat, 2021), justifying the greater investment allocated to these sectors.

FIGURE 3
ALLOCATION OF FUNDS WITH SIGNIFICANT CLIMATE CONTRIBUTION (IN BILLIONS OF EUROS) IN SELECTED NRRPS



SOURCE: Lázaro Touza et al. (2022).

FIGURE 4
ALLOCATION OF FUNDS WITH SIGNIFICANT CLIMATE CONTRIBUTION IN SELECTED NRRPS
(In %)



SOURCE: Lázaro Touza et al. (2022)

As argued by Lázaro Touza et al. (2022) the key policy instruments used to implement the NRRPs are: public spending, regulation, subsidies, tax exemptions and deductions. New carbon pricing instruments could have been expected after economic recovery to help restore public finances (OECD, 2020). However, the current energy price spike and Russia's invasion of Ukraine might make carbon pricing initiatives unfeasible at this stage.

The extent to which NRRPs in the EU (and across other jurisdictions) contribute to the achievement of green deal goals will depend on whether several hard to come by challenges are effectively addressed. These have been summarized in Box 1.

BOX 1

KEY CHALLENGES IN THE SUCCESSFUL IMPLEMENTATION OF NRRPS

- The inclusion of concrete goals in NRRPs that will enable ex-post evaluation.
- The integration of NRRPs and broader climate and energy legislation.
- Updating legislative frameworks to reflect COVID-19 and Net-Zero targets.
- Greater definition of the policy instruments to be used.
- Limited administrative capabilities.
- Weak governance structures.
- The capacity to effectively absorb the influx of Next Generation EU funds ahead of 2026.
- The selection of truly transformative projects.
- The engagement with sub-national governments and non-state actors.
- Preventing social and political backlash by ensuring a Just Transition and explaining and raising awareness of the reforms envisaged in the NRRPs.
- Energy transition goals require long-term investments after NGEU funds are disbursed. Reflecting on long-term investment needs is arguably required.

SOURCE: Lázaro Touza et al. (2022)

4. Discussion

Green deals and recovery programmes presented in previous sections advocate for reinvigorating economic growth, reducing unemployment, decarbonising the economy and, in the case of the European Green Deal, decoupling resource use from GDP growth.

Based on Hepburn et al. (2020), this section first builds on the analysis of policies implemented after the 2008 Global Financial Crisis to discern whether governments overall selected policies that would yield high long-term economic multipliers and high (and positive) climate impacts. Policies under this approach could be included in the ecomodernism school of thought that is based on three core strategies: green technological innovation, resource efficiency and the sustainable use of land (IPCC, 2022).

The discussion then follows Green (2020) in asking whether the New Deal that inspired green deal proposals and recovery plans after the Global Financial Crisis and the COVID-19 pandemic can lead to a net-zero (emissions) economy given their pro-growth approach. In so doing this final part of the discussion reflects on one of

the low carbon transformation pathways included for the first time in the IPCC's latest report (IPCC, 2022): degrowth[14], which considers sharing the remaining and diminishing global carbon budget using legislation to limit GHG overshoot and abandoning growth as a key economic objective. The purpose of the degrowth discussion is not to advocate for it but rather to explore, in a preliminary manner and pending future research, opposing theoretical options in delivering a net-zero development model to which governments around the world agreed to in the Paris Agreement. This debate, as Jackson and Webster (2016) contends, remains essential in understanding future challenges to economic progress.

Early on in 2020 Hepburn et al. (2020) published the results of a survey conducted among 231 economic experts from central banks and finance ministries. Experts evaluated 700 policies that had been implemented since the Global Financial Crisis. The survey plus evidence from academic literature concluded that the following policies summarised in Box 2 can deliver economic growth and foster meeting climate goals:

BOX 2

POLICIES FOR ECONOMIC GROWTH AND A CLIMATE-POSITIVE RECOVERY

- Clean R&D spending.
- Clean physical infrastructure investment in the form of renewable energy assets, storage (including hydrogen), grid modernisation, and CCS technology.
- Investment in education and training to address unemployment caused by COVID and unemployment caused by decarbonisation.
- General R&D spending.
- Building efficiency spending for renovations and retrofits including improved insulation, heating, and domestic energy storage systems.
- Natural capital investment for ecosystem resilience and regeneration including restoration of carbon-rich habitats and climate-friendly agriculture.
- In many low and middle-income countries, clean R&D spending might be replaced with:
- Rural support scheme spending, particularly that associated with sustainable agriculture, ecosystem regeneration, or accelerating clean energy installations.

SOURCE: Hepburn et al. (2020).

Comparing the results from Table 1 (Barbier, 2016) with policies in Box 2 above it can be argued that clean R&D spending –one of the measures with higher long-term economic multiplier and high positive climate impact– was not the primary

[14] In this context degrowth has been defined as a "planned reduction of energy and resource use designed to bring the economy back into balance with the living world in a way that reduces inequality and improves human well-being" (Hickle, 2021).

focus of the 2008 recovery packages after the Global Financial Crisis. Investment in education and training was also largely absent in the analysis of post 2008 recovery programmes. According to the OECD (2021) in the post COVID-19 action to foster R&D and upskilling workers have also been limited.

Post 2008, low carbon power (including investments in renewables, nuclear energy and CCS) received 3.2 % of total fiscal stimulus in those countries analysed by Barbier (2016)[15]. Energy efficiency was awarded 10.1 % of the total fiscal stimulus. Waste, water and pollution received 2.4 % of the total fiscal stimulus. In the post COVID-19 era, stimulus packages analysed by the OECD (2021) saw investments in renewables, ground transport and buildings topped sectoral stimulus as of 2021 reaching $455 billion.

Transport, energy efficiency in buildings and investments in clean energy are the key sectors to which NRRPs across the EU's largest emitters are allocated. Innovation and education are only prominent in French and Spanish post-COVID recovery plans. Agriculture has received limited funding in the EU's largest emitter's NRRP, as has been the case across OECD+ countries analysed by the OECD (2021).

Overall, investments in transport and energy infrastructure are common from the New Deal to the recent green deals and post-COVID-19 recovery pans. Building efficiency and investments in nuclear, CCS and renewables have been significant in post 2008 fiscal stimulus programs as well as in post COVID-19 recovery plans. A common gap in these plans seems to be investment in clean R&D as well as upskilling workers. However, government actions in these areas might have been included in other initiatives that have not been covered by recovery plans.

Finally, some authors (e.g., Green, 2020; Taherzadeh, 2021; Hickle & Kallis, 2020) have argued that New Deal-inspired green deals might not be fit for purpose. They argue that pro-growth New Deal responses are conceptually ill-suited to address economic and environmental/climate crises caused by over-consumption and growth. It has been argued that countries have nevertheless put forth pro-growth green deals to deal with economic and climate crises as steady state and degrowth options would have been socially and politically unfeasible (Haberl et al., 2020).

Other authors however (including Pollin, 2018; Trezi, 2022; Jackson & Webster, 2016) criticise degrowth on a number of grounds. Some of the arguments put forth by degrowth analysts and critics include: 1) that degrowth theory is more a slogan than a coherent transformational proposal that is only supported by a handful of 'radical academics and activists' whose proposals do not yet offer a blueprint for a new society; 2) degrowth theory lacks a complete GHG stabilisation framework; 3) if fossil fuels were replaced by a combination of renewables and energy efficiency this would lead to significant (and climate positive) economic growth; 4) the case of Japan, which has grown little in the past decades and remains a very high emitter,

[15] G20 countries plus non-G20 EU countries and non-EU countries: Austria, Belgium, Greece, Hungary, the Netherlands, Poland, Portugal, Spain, and Sweden, Chile, Israel, Malaysia, New Zealand, Norway, the Philippines, Switzerland, Thailand, and Vietnam.

is seen as a rebuttal of degrowth; 5) dating back to the limits to growth debate back in the 70's (Meadows et al., 1972; Jackson & Webster, 2016) degrowth proponents allegedly paid limited attention to the growth-innovation-substitution potential of economic systems; 6) degrowth would likely bring undesirable economic impacts such as debt defaults and limited fiscal space to respond to crises such as the one caused by COVID-19 or the energy crisis caused by Russia's invasion of Ukraine, all of which are known to disproportionally affect the poor; 7) since growth and employment are highly correlated, embracing degrowth would require managing higher unemployment levels; 8) degrowth will dismantle current incentives for innovation, including green innovation that is crucial for a net-zero society. This would call for a new innovation system to be devised within a degrowth paradigm.

The debate on the relationship between economic growth and the environment is decades old and far from being resolved. An environmental Kuznets Curve for greenhouse gas emissions remains elusive on a global level as turning points would be well above current incomes (Neumayer, 2013). More broadly, Hickle and Kallis (2020) also highlight the lack of evidence on a global scale regarding absolute decoupling between economic growth and resource use. The key issue though, in the authors opinion, is not so much with resource use but with the environment's limited pollution absorption capacity. Hickle and Kallis (2020) also highlight the unlikely 1.5ºC-compatible decoupling of growth and greenhouse gas emissions. These authors hence question the green growth paradigm and suggest policymakers should seek other alternatives to future development.

Green (2020) encourages learning from the New Deal regarding government planning, significant investment efforts and a socioeconomic transformation that had a broad and speedy reach. He furthermore suggests embracing the idea of economic policy being tailored (flexible) to the specific context in which it must be applied. Such a context is now that of a carbon-constrained world with multiple socioeconomic and environmental crises occurring simultaneously and interacting with each other. Green argues for the abandonment of a so-called "productivist" model and suggests the uptake of "new statistical imaginaries" that would help transcend the New Deal era of GDP growth in favour of other development measures that would include the environment.

These "imaginaries" have been developed since the 1990's (Atkinson et al., 1997) and include indicators such as Genuine Savings (GS), now called Adjusted Net Savings (ANS), that measures weak sustainability assuming perfect substitution of different forms of capital. Indicators of strong sustainability have also been developed (and criticised) including the use of ecological footprints, sustainability gap analysis, etc (Dietz & Neumayer, 2007). Although green national accounting has gained ground, GDP is still the measure of choice, even if its limits as a measure of welfare and disregard for natural capital and environmental bads (Pollin, 2018) are well known.

Based on the above discussion we argue that given the limited progress in reducing greenhouse gas emissions (despite past climate policy efforts, green deal proposals and green recovery plans), further academic enquiry into alternative modes

of development is still warranted and will be increasingly demanded by civil society and, ultimately, politicians that will have to deal with the impacts, adaptation costs, losses and damages resulting from climate change.

Abandoning growth is unlikely to be the solution, given innovation for a low-carbon transition requires significant amounts of capital and growth. Properly including sources and sinks in our GDP estimates and subjecting growth optimisation goals to 1.5ºC carbon budgets that result in absolute decoupling of said growth, fossil fuel (Pollin, 2018) and land–use emissions could arguably be the (extremely hard) way forward if we are hoping to avoid having to fight future wars over food and water (EC, 2021).

7. Conclusions

Scientific evidence on the causes and the impacts of climate change indicates that if we want to avoid catastrophic climate change, we must engage this decade in a rapid, orderly and profound restructuring of the global economy, with developed countries taking the lead. Conscious of the limited decarbonisation progress so far and seeking to reap the benefits of first mover advantages in the low-carbon world countries have proposed economy-wide transformation roadmaps.

New Deal-inspired green deal proposals put forth since the turn of the century have sought to design a grand strategy for a new development model that yields economic growth, green competitiveness, a fair transition and climate neutrality. Fiscal stimulus programmes enacted in the aftermath of the Global Financial Crisis and amid the COVID-19 pandemic have, to a greater or lesser extent, been guided by green deal proposals. Both green deal proposals and economic recovery plans are grounded on a pro-consumption and pro-growth paradigm.

However, whether greenhouse gas emissions can be decoupled from economic growth globally is unclear. Empirical evidence indicates absolute decoupling of economic growth and greenhouse gas emissions has not occurred so far on a global scale, although a handful of high-income countries have shown past growth and emissions decoupling (Jackson, 2017; Pollin, 2018). But, even if CO_2 emissions followed an Environmental Kuznets Curve, turning points would arguably be unattainable at present in many countries. Hence, it has been argued that pro-growth New Deal-inspired green deals could be ill-suited to respond to an overconsumption-related problem whose emissions are leading to an unsafe operating space for humanity (Rockström et al., 2009).

Discussions of degrowth as an alternative development model are once again re-emerging and have been included in the latest analysis of peer-reviewed literature undertaken by the IPCC. Even if degrowth models have low social and political appeal at present and could potentially hinder low carbon innovation, further academic enquiry into alternative modes of development that include developing within planetary boundaries (*Ibid.*) is warranted and will be increasingly demanded as the impacts of climate change become more severe.

References

Atkinson, G., Hett, T., & Newcombe, J. (1997). *Measuring "corporate sustainability"*. CSERGE Working Paper GEC 99-01.

Barbier, E.B. (2009). *Rethinking the Economic Recovery: A Global Green New Deal*. UNEP.

Barbier, E. B. (2010). Global governance: The G20 and a global green new deal. *Economics*, *4*(1), 1-29.

Barbier, E.B. (2016). Building the green economy. *Canadian Public Policy*, *42*(s1), S1–S9.

Barbier, E. B. (2019a). How to make the next Green New Deal work. *Nature*, *565*(7737), 6-7.

Barbier, E.B. (2019b). *The Fall and Rise of the Green New Deal. Public Administration Review Bully Pulpit Symposium on "The Green New Deal: Pathways to a Low Carbon Economy*", July 16, 2019.
https://www.publicadministrationreview.com/2019/07/16/gndbarbier/

Berghmans, N. (2021, September 10). Is the French recovery and resilience plan climate-compatible? A preliminary analysis. ARI nº 75/2021. *Elcano Royal Institute*.

Bieliszczuk, B. (2021, October 10). The Polish Recovery Plan: a careful step toward energy transition. ARI nº 87/2021. *Elcano Royal Institute*.

Bureau of reclamation. (2022). *About us*. Last access the 20th of March 2022.
https://www.usbr.gov/main/about/fact.html

Climate Action Tracker (2021). *Glasgow's 2030 credibility gap: net-zero's lip service to climate action Wave of net-zero emission goals not matched by action on the ground*. Warming Projections Global Update, November 2021. Last accessed the 14th of March 2022. https://climateactiontracker.org/documents/997/CAT_2021-11-09_Briefing_Global-Update_Glasgow2030CredibilityGap.pdf

Dietz, S., & Neumayer, E. (2007). Weak and strong sustainability in the SEEA: concepts and measurement. *Ecological Economics*, *61*(4), 617-626.

Dietz, S. (2019, February 14). *The economics of 1.5°C climate change*. [video]. Youtube. Last accessed the 8th of March, 2022. https://www.youtube.com/watch?v=t_8S2qX5ONs

EC, European Commission. (2020a). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. *The European Green Deal*. Last accessed the 18th of March 2022. https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

EC, European Commission. (2020b). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. *Sustainable Europe Investment Plan European Green Deal Investment Plan.* Last accessed the 18th of March 2022. https://ec.europa.eu/commission/presscorner/detail/en/fs_20_48

EC, European Commission. (2020c). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. *Sustainable Europe Investment Plan European Green Deal Investment Plan*. Last accessed the 28th of March 2022. https://eurlex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:52020DC0021&from=EN

EC, European Commission. (2021). *Statement by Executive Vice-President Timmermans on delivering the European Green Deal*. Last accessed the 11th of August 2022). https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_21_3722

EC, European Commission. (2022). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. *REPowerEU: Joint European Action for more affordable, secure and sustainable energy.* Last accessed the 12th of March 2022. https://eur-lex.europa.eu/resource.html?uri=cellar:71767319-9f0a-11ec-83e1-01aa75ed71a1.0001.02/DOC_1&format=PDF.

EEA, European Environment Agency. (2022). *European Scientific Advisory Board on Climate Change*. Last access the 24th of August 2022. https://www.eea.europa.eu/about-us/climate-advisory-board/members-of-the-advisory-board

Feás, E., & Steinberg, F. (2021, July 6). The climate and energy transition component of the Spanish National Recovery and Resilience Plan. *ARI* nº 64/2021. *Elcano Royal Institute*.

Foxon, J. T., Köhler, J., Michie, J., Oughton, C. (2012). Towards a new complexity economics for sustainability. *Cambridge Journal of Economics, 37*(1), 187-208. https://doi.org/10.1093/cje/bes057

Friedman, T. L. (2007, April 15). The power of Green. *The New York Times*. Last accessed the 27th of March, 2022. https://www.nytimes.com/2007/04/15/opinion/15iht-web-0415edgreen-full.5291830.html

Galvin, R., & Healy, N. (2020). The Green New Deal in the United States: What is it and how to pay for it. *Energy Research and Social Science*, *67*. https://doi.org/10.1016/j.erss.2020.101529

Green New Deal Group. (2008). *A Green New Deal. Joined-up policies to solve the triple crunch of the credit crisis, climate change and high oil prices*. Green New Economics Foundation. Last accessed the 14th of August 2022. https://neweconomics.org/uploads/files/8f737ea195fe56db2f_xbm6ihwb1.pdf

Green, J. (2020). The Green New Deal in the Shadow of Keynes – old ideas for new challenges?. *Cambridge Open Engage*. https://doi.org/10.33774/coe-2020-dz5q5

Greve, J. (2022, August 12). US House passes Democrats' landmark healthcare and climate Bill. *The Guardian*. Last accessed the 13th of August 2022. https://www.theguardian.com/us-news/2022/aug/12/us-house-passes-climate-bill-inflation-reduction-act

Haberl, H., Wiedenhofer, D., Virág, D., Kalt, G., Plank, B., Brockway, P., Fishman, T., Hausknost, D., Krausmann, F., Leon-Gruchalski, B., Mayer, A., Pichler, M., Schaffartzik, A., Sousa, T., Streeck, J., & Creutzig, F. (2020). A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part II: synthesizing the insights. *Environmental Research Letters*, *15*(6). https://doi.org/10.1088/1748-9326/ab842a

Hepburn, C., O'Callaghan, B., Stern, N., Stiglitz, J., & Zenghelis, D. (2020). Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?. *Oxford Review of Economic Policy*, *36*(Supplement_1), S359-S381.

Hickle, J., & Kallis, G. (2020). Is green growth possible?. *New Political Economy, 25*(4), 469-486. https://doi.org/10.1080/13563467.2019.1598964

Hickel, J. (2021). What does degrowth mean? A few points of clarification. *Globalizations, 18*(7), 1105-1111. https://doi.org/10.1080/14747731.2020.1812222

Hope, C., & Newbery, D. (2006). *Calculating the social cost of carbon*. Working Papers EPRG 0720, Energy Policy Research Group, Cambridge Judge Business School, University of Cambridge. Last accessed the 13th of August 2022. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.320.6580&rep=rep1&type=pdf

IEA, International Energy Agency. (2021). *COP26 climate pledges could help limit global warming to 1.8 °C, but implementing them will be the key.* Last accessed the 8th of March, 2022.https://www.iea.org/commentaries/cop26-climate-pledges-could-help-limit-global-warming-to-1-8-c-but-implementing-them-will-be-the-key

IMF, International Monetary Fund. (2021). *Building Back Better: How Big Are Green Spending Multipliers?*. IMF Working paper, Working Paper No 2021/087.

IPCC, Intergovernmental Panel of Climate Change. (2021). Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 3−32. https://doi.org/10.1017/9781009157896.001

IPCC, Intergovernmental Panel of Climate Change. (2022). Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–33.

Jackson, T., & Webster, R. (2016). *LIMITS REVISITED. A review of the limits to growth debate*. All Party Parliamentary Group (APPG) on Limits to Growth. Last accessed the 12th of August 2022. https://limits2growth.org.uk/wp-content/uploads/Jackson-and-Webster-2016-Limits-Revisited.pdf

Jackson, T. (2017). *Prosperity without Growth: Economics for a Finite Planet.* Oxon: Routledge.

Kennedy, D. M. (2009). What the New Deal Did. *Political Science Quarterly*, *124*(2), 251-268. https://www.jstor.org/stable/25655654

Kiefer, C. (2021, July 19). Next Generation EU: Germany focuses its climate policy on hydrogen and sustainable mobility. ARI nº 69/2021. *Elcano Royal Institute*.

Köberle, A. C., Vandyck, T., Guivarch, C., Macaluso, N., Bosetti, V., Gambhir, A., Tavoni, M., & Rogelj, J. (2021). The cost of mitigation revisited. *Nature Climate Change,* 11, 1035–1045. https://doi.org/10.1038/s41558-021-01203-6

Lázaro Touza, L., Averchenkova, A., & Escribano Francés, G. (2022). High-impact green recovery in the EU's 'big five' (emitters): key elements and caveats. Elcano Policy Paper. *Elcano Royal Institute.*

Leiter, T. (2021). Do governments track the implementation of national climate change adaptation plans? An evidence-based global stocktake of monitoring and evaluation systems. *Environmental Science and Policy, 125*, 179–188. https://doi.org/10.1016/j.envsci.2021.08.017

Le Quéré, C., Korsbakken, J. I., Wilson, C., Tosun, J., Andrew, R., Andres, R. J., Canadell, J. G., Jordan, A., Peters, G. P., & van Vuuren, D. P. (2019). Drivers of declining CO_2 emissions in 18 developed economies *Nature Climate Change, 9*(3), 213–217. https://doi.org/10.1038/s41558-019-0419-7

Manchin, J. (2021). *Manchin Statement on Build Back Better Act*. Last accessed the 24th of March, 2022. https://www.manchin.senate.gov/newsroom/press-releases/manchin-statement-on-build-back-better-act

Mastini, R., Kallis, G., & Hickel, J. (2021). A Green Deal without growth?. *Ecological Economics*, *179*. https://doi.org/10.1016/j.ecolecon.2020.106832

Mathis, W. (2022, January 27). *Energy Transition Drew Record $755 Billion of Investment in 2021*. Bloomberg.

Mattei, L., & Bellisai, F. (2021, December 16). Italy's National Recovery and Resiliency Plan's climate impact. ARI nº 107/2021. *Elcano Royal Institute*.

Meadows, D., Meadows, D., Randers, J., & Behrens III, W.W. (1972). *The Limits to Growth*. Universe Books. Last accessed the 12th of August 2022. https://www.donellameadows.org/wp-content/userfiles/Limits-to-Growth-digital-scan-version.pdf

Nahm, J., Miller, S., & Urpelainen, J. (2022). G20's US$14-trillion economic stimulus reneges on emissions pledges. *Nature*, *603*(7899), 28-31. https://doi.org/10.1038/d41586-022-00540-6

National Archive. (2022). *National Industrial Recovery Act (1933)*. Last accessed the 20th of March 2022. https://www.archives.gov/milestone-documents/national-industrial-recovery-act#:~:text=On%20June%2016%2C%201933%2C%20this,by%20which%20President%20Franklin%20D.

Neumayer, E. (2013). *Weak versus Strong Sustainability. Exploring the Limits of Two Opposing Paradigms*, Fourth Edition. Edward Elgar.

OECD, Organisation for Economic Co-operation and Development. (2021). *Key findings from the update of the OECD Green Recovery Database*. Last accessed the 25th of March 2022. https://read.oecd-ilibrary.org/view/?ref=1109_1109272-nuk0ptos4l&title=Key-findings-from-the-update-of-the-OECD-Green-Recovery-Database

Pollin, R. (2018). De-growth vs a green new deal. *New Left Review,* 112, 5-25.

Probasco, J. (2022, February 23). Understanding Infrastructure Legislation. Investopedia. Last accessed the 26th of March 2022. https://www.investopedia.com/here-s-what-s-in-the-usd1-trillion-infrastructure-bill-passed-by-the-senate-5196817#citation-48

Real Instituto Elcano. (2022). *Barómetro del Real Instituto Elcano Resultados octubre-noviembre de 2021 y febrero de 2022, 42ª oleada Madrid, febrero de 2022*. Last accessed the 25th of March, 2022. https://media.realinstitutoelcano.org/wp-content/uploads/2022/02/42brie-informe-febrero2022.pdf

Roberts, J. (2011). *Environmental Policy*. 2nd Edition. Oxon: Routledge.

Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin III, F.S., Lambin, E., Lenton, T.M., Scheffer, M., Folke, C., Schellnhuber, H., Nykvist, B., De Wit, C.A., Hughes, T., van der Leeuw, S., Rodhe H., Sorlin, S., Snyder, P.K., Costanza, R., Svedin, U., … Foley, J. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society, 14*(2). http://www.ecologyandsociety.org/vol14/iss2/art32/

Rogelj, J., Shindell, D., Jiang, K., Fifita, S., Forster, P., Ginzburg, V., Handa, C., Kheshgi, H., Kobayashi, S., Kriegler, E., Mundaca, L., Séférian, R., & Vilariño, M.V. (2018). Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development. In: *Global*

Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. [Masson-Delmotte, V., Zhai, P., Pörtner, H.-O., Roberts, D., Skea, J., Shukla, P.R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., Connors, S., Matthews, J.B.R., Chen, Y., Zhou, X., Gomis, M.I., Lonnoy, E., Maycock, T., Tignor, M., & Waterfield, T. (eds.)]. In Press.

Shiller, R. J. (2017). Narrative Economics. *American Economic Review*, *107*(4), 967-1004.

Stern, N. (2006). *The Economics of Climate Change. The Stern Review*. Cambridge University Press. https://doi.org/10.1017/CBO9780511817434

Taherzadeh, O. (2021). Promise of a green economic recovery post- Covid: trojan horse or turning point? *Global Sustainability, 4* E2, 1–6. https://doi.org/10.1017/sus.2020.33

Trezi, A. (2022). *Growth for Good. Reshaping Capitalism to Save Humanity from Climate Catastrophe*. Harvard University Press.

UN, United Nations. (2015). *Paris Agreement*. Last accessed 15th of March 2022. https://unfccc.int/sites/default/files/english_paris_agreement.pdf

UNEP, United Nations Environment Programme. (2009). *Global Green New Deal*. Green Economy Initiative, Nairobi, Kenya.

UNEP, United Nations Environment Programme. (2020). *Emissions Gap Report*. Last accessed the 27th of March 2022. https://www.unep.org/interactive/emissions-gap-report/2020/

UNFCCC, United Nations Framework Convention on Climate Change. (2021, November 4). Nationally determined contribution synthesis report. Last accessed the 20th of March 2022. https://unfccc.int/sites/default/files/resource/message_to_parties_and_observers_on_ndc_numbers.pdf

UN Habitat. (2020). *World Cities Report 2020. The value of Sustainable Urbanization.* Last accessed the 14th of March 2022. https://unhabitat.org/sites/default/files/2020/10/wcr_2020_report.pdf

Vivid Economics and Finance for Biodiversity Initiative. (2021). *Greenness of Stimulus Index*. Last accessed the 14th of August 2022. https://www.vivideconomics.com/wp-content/uploads/2021/01/201214-GSI-report_December-release.pdf

Von der Leyen, U., & Hoyer, W. (2021, March 22). *A Global Green Deal*. Last accessed the 14th of August 2022. https://ec.europa.eu/commission/presscorner/detail/fr/ac_21_1322

Washington Post. (2022, March 6). *Opinion: Make a deal with Manchin on Build Back Better*. Editorial Board Opinion. Last accessed the 24th of March 2022. https://www.washingtonpost.com/opinions/2022/03/06/make-deal-with-manchin-build-back-better/

Weitzman, M. L. (1974). Prices *vs.* Quantities. *The Review of Economic Studies*, *41*(4), 477–491. https://doi.org/10.2307/2296698

Winkler, A. (2009, March 31). *The New Deal: Accomplishments and Failures*. Testimony before the U.S. Senate Committee on Banking, Housing, and Urban Affairs. Last accessed the 7th of March 2022. https://www.banking.senate.gov/imo/media/doc/WinklerTestimony33109TheNewDealSenateTestimony.pdf